

Mission Summary

Hurricane Dennis IFEX Research Mission Summary 050709I Aircraft: N43RF

Scientific Crew:

Lead Project Scientist	Michael Black
Radar Scientist	Peter Dodge
Workstation Scientist	Krystal Valde
Cloud Physics	Paul Willis
AXBT/SFMR Scientist	Eric Uhlhorn

Aircraft Crew:

Pilots	Randall TeBeest, Mark Nelson
Flight Engineers	Dewie Floyd
Navigators	Devin Brakob
Flight Director	Marty Mayeaux, Tom Shepherd,
Engineers	Terry Lynch, Jim Baar

Mission Brief:

This mission was a follow on to the 42's night flight as Dennis exited the north coast of Cuba through the Florida straights and into the SE Gulf of Mexico. Here, we wished to examine the structural changes associated with the expected redevelopment of Dennis after traversing Cuba the day before. The flight would originate in San Jose, CR and would land in Jacksonville NAS, Florida in anticipation of a follow-on landfall flight. Although N43 planned takeoff was 2-3 hours later than the NASA ER2, it was hoped that a single pass through Dennis could be coordinated. The NOAA P3 would execute a figure 4 or butterfly pattern with 75 nmi leg lengths at an altitude of 12,000 ft. Takeoff for the P3 was scheduled for 1400 UTC for a 9-h mission. We planned to drop 20 regularly spaced GPS sondes and 4 AXBTs during the butterfly pattern. A short (30 nmi legs) figure 4, centered around Buoy 42039 in the north central gulf was planned with AXBT drops at the buoy and end points and a GPS sonde at the buoy itself. The buoy was forecast to be in the path of Dennis about the time N43 would be flying a landfall mission. The sonde and AXBT data collected on this and a subsequent flight could prove to be valuable for ongoing air-sea interaction studies.

Mission Synopsis:

Takeoff from San Jose was at 1413 UTC and NOAA43 headed northward for the Initial Point (IP) 75 nmi west of the projected center of Dennis. Here, we planned a west to east pass through the eye of Dennis. The IP was reached at 1758 UTC after a descent to 12,000 ft from the ferry altitude. The radar signature of Dennis during the approach to

Dennis was well-defined and we adjusted our track based on the center that was estimated from the LF radar display. N43 tracked eastward and was in the eye at 1816 UTC and 75 nmi east of the eye 1828 UTC. Maximum flight-level winds on the inbound (west side) leg were about 75 kt while they were about 90 kt on the outbound, east side. The surface SFMR winds were about 55 kt inbound and 80 kt outbound and the minimum central pressure in the eye was 958 mb. Surface winds from dropsondes matched well with the SFMR readings. While the eye appeared fairly clear of radar reflectivity features on the LF radar, the aircraft was in thin cloud during its passage through the eye.

The NOAA P3 headed NW downwind to a point 75 nmi north of the eye at 1857 UTC where the aircraft proceeded south through the eye. The eye was reached at 1914 UTC and 43 reached its southern point 75 miles away at 1930 UTC. The winds appeared to be strongest on the northern side of Dennis with flight-level winds at about 100 kt and SFMR winds of about 90 kt. A GPS sonde reported winds of about 120 kt below flight level but well above the surface. The winds were generally about 20 kt weaker on the south side.

The final leg through Dennis was from the SE to the NW. We reached our SE point, 75 nmi from the eye at 1943, the eye at 2002 and were 75 nmi NW of the center at 2021 UTC. Winds on the SE side were a maximum of about 90 kt at flight level and 75 kt at the sfc while winds at flight level and the surface in the NW quadrant were 85 and 70 kt, respectively. The GPS sonde released in the eye had a failed launch detect but the P3 measured 950 mb extrapolated from 12,000 ft, which equates to about 955 mb considering extrapolation errors. An AXBT released in the NW quadrant measured 28° C SST but with a shallow, 20 m mixed-layer depth.

The final part of the mission was to perform the short figure 4 centered around buoy 42039, releasing AXBTs at the end points and at the buoy. A GPS sonde was also released at the buoy location. We descended to 10,000 ft and depressurized before reaching a point 30 nmi south of the buoy at 2042 UTC. The AXBTs measured uniform SST of about 28° C within 60 nmi of the buoy and relatively shallow mixed-layer depths of 20-30 m. Flight-level winds were about 40 kt and surface winds were between 25 and 30 kt near the buoy.

At 2148 UTC NOAA climbed out of the pattern and headed for Jacksonville NAS and we landed at the base at about 2230 UTC.

Problems:

Three of the 25 sondes did not have launch detects (no data) and several more had intermittent winds. Otherwise, the radars, main data system, and AXBTs worked well. NOAA43 did not have an opportunity to coordinate any of the pattern with the NASA ER2.

Michael Black
7/8/05

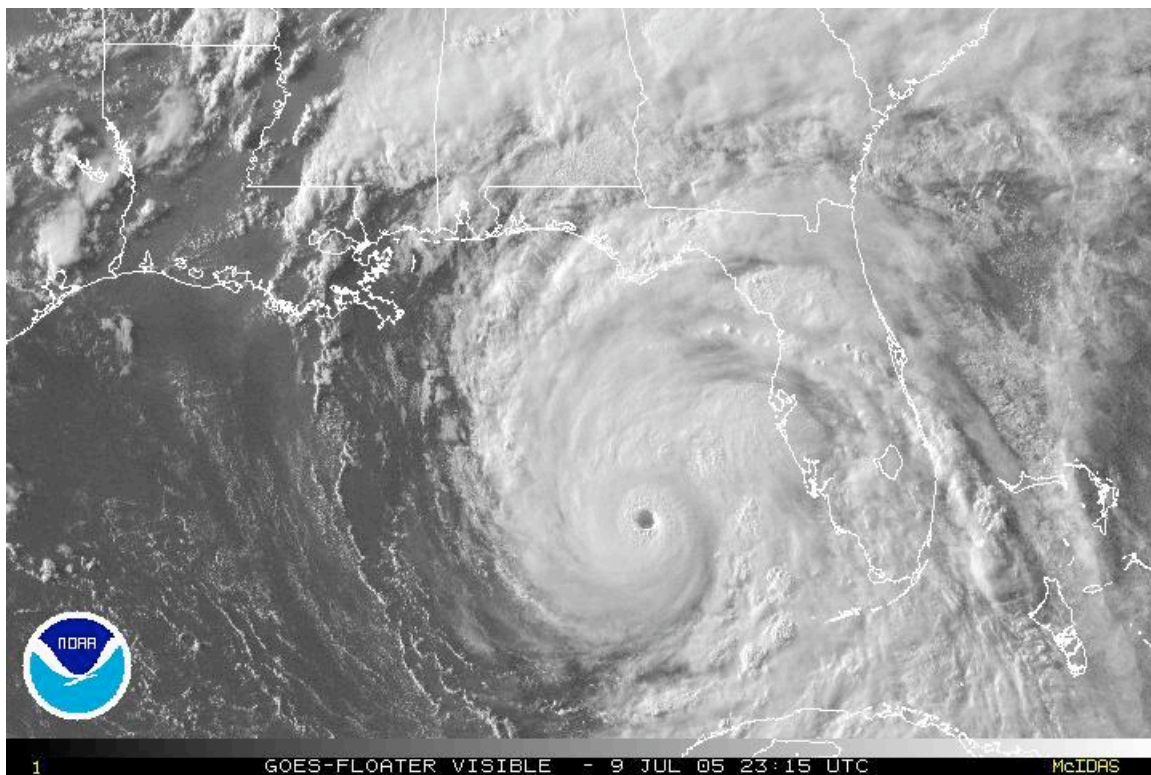


Fig. 1: GOES visible satellite image of Dennis at 2315 UTC.

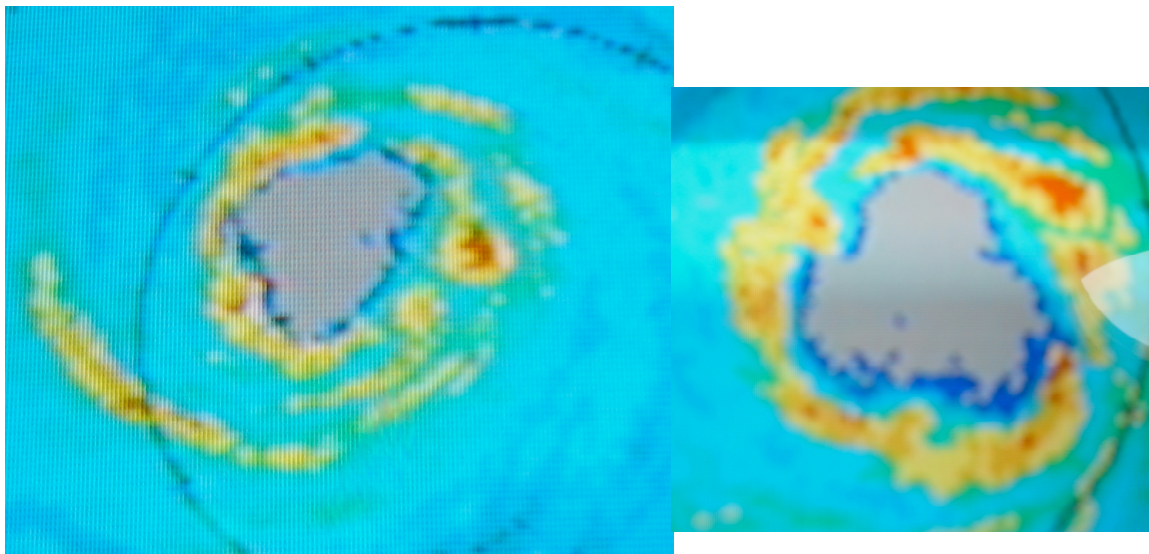


Fig. 2: Photos of the NOAA43 LF radar showing the structure of the eye and eyewall of Dennis during the flight.

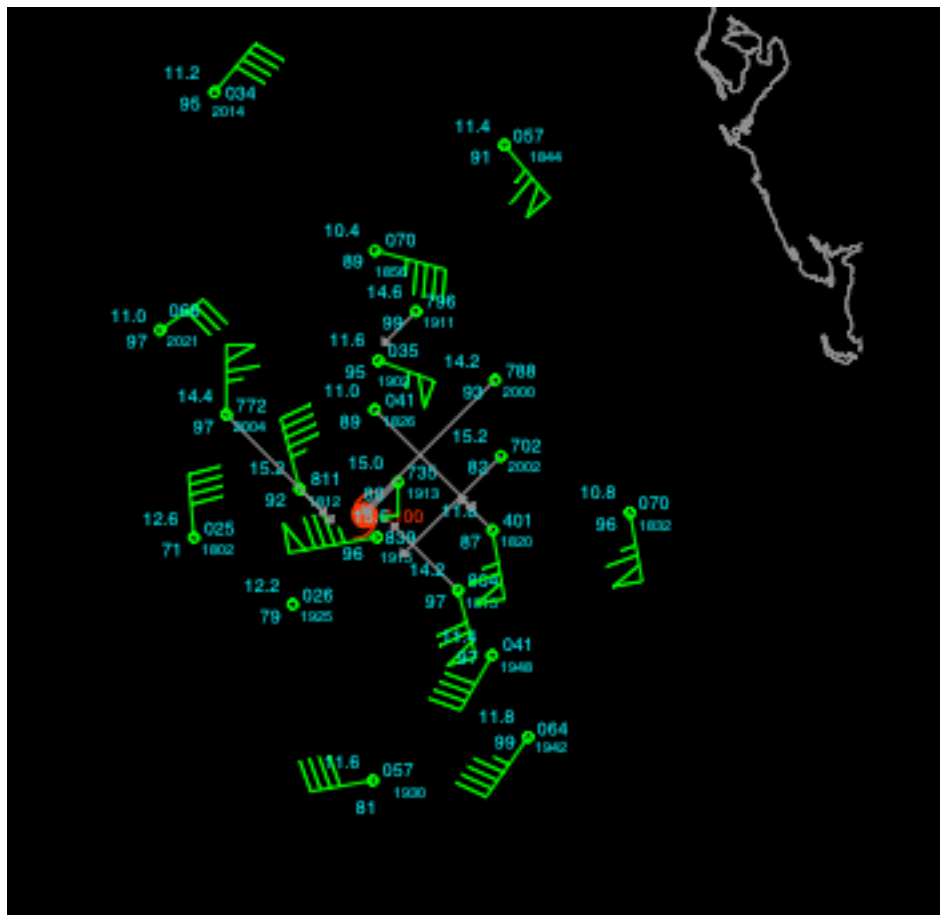


Fig. 3: GPS dropsonde observations at 700 mb.

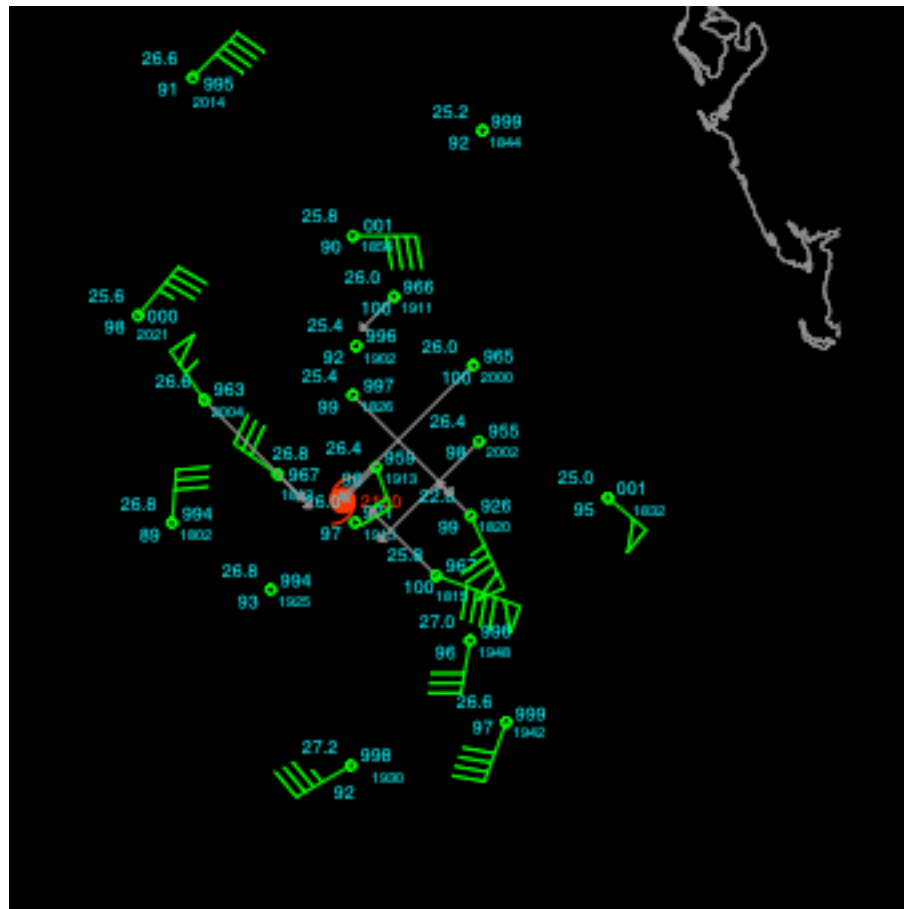


Fig. 4: GPS dropsonde observations at 925 mb.

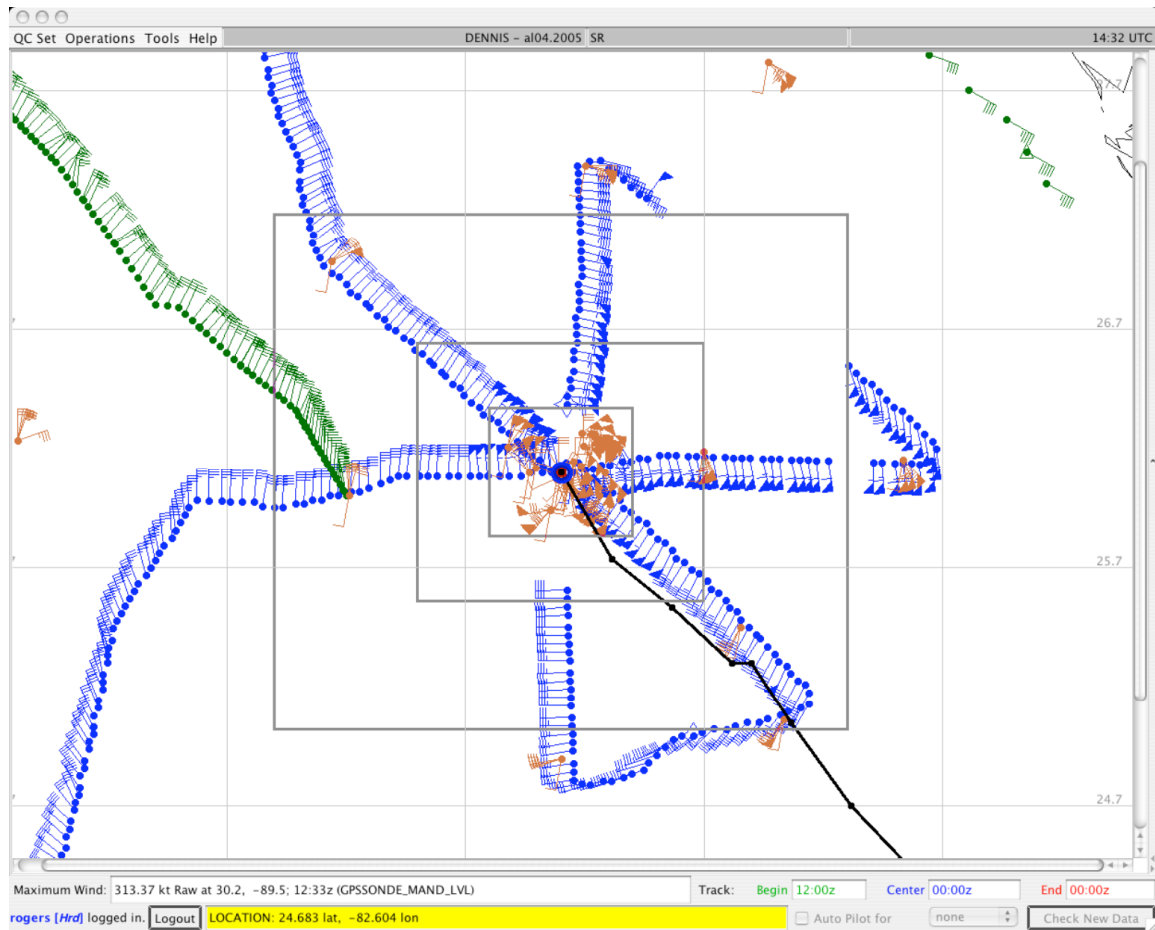


Fig. 5: Wind observations from flight level (blue), GPS sondes at mandatory levels (brown) and a NOAA Buoy (green). The data are plotted in storm-relative coordinates from transmitted data using the HRD H*WIND analyses.

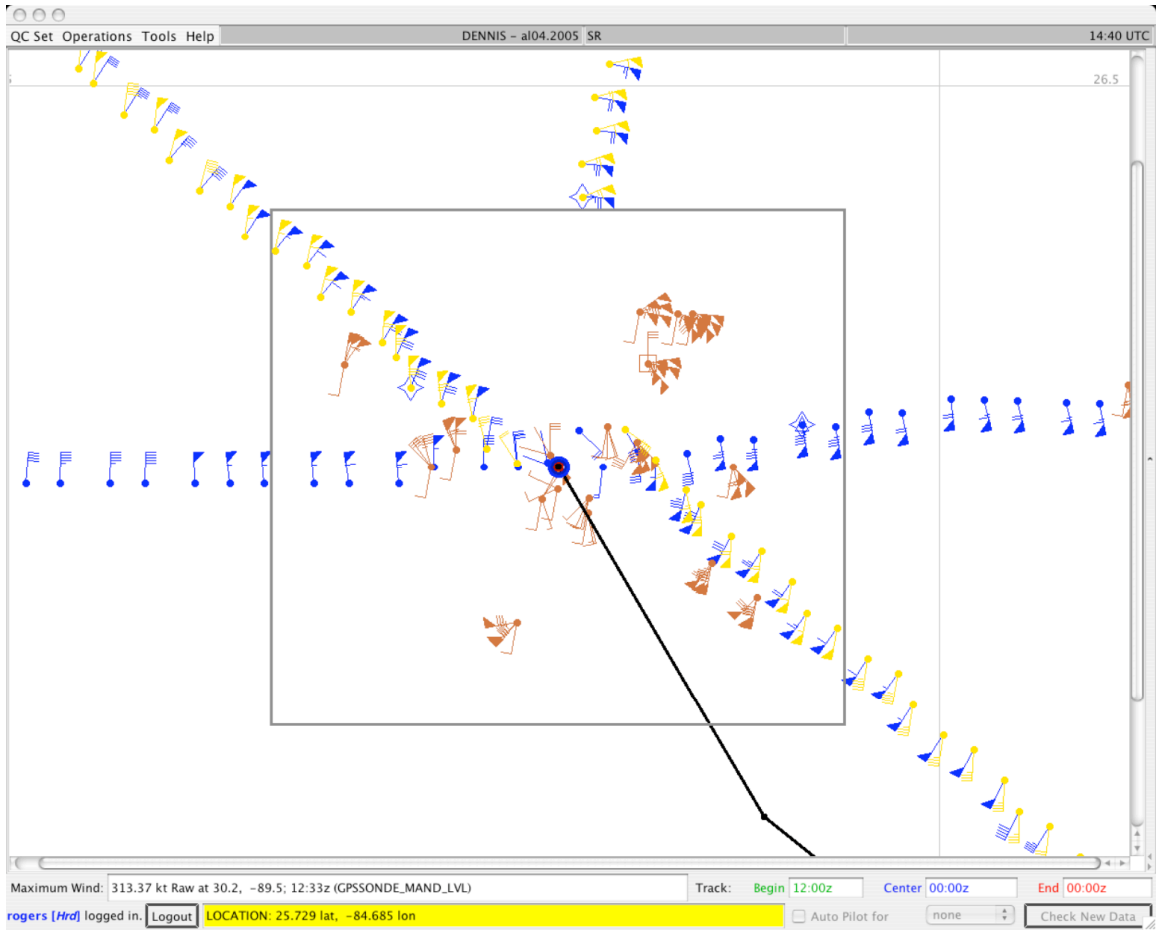


Fig. 6: Wind observations from flight level (blue), GPS sondes at mandatory levels (brown) and surface (SFMR, yellow). The data are plotted in storm-relative coordinates from transmitted data using the HRD H*WIND analyses.

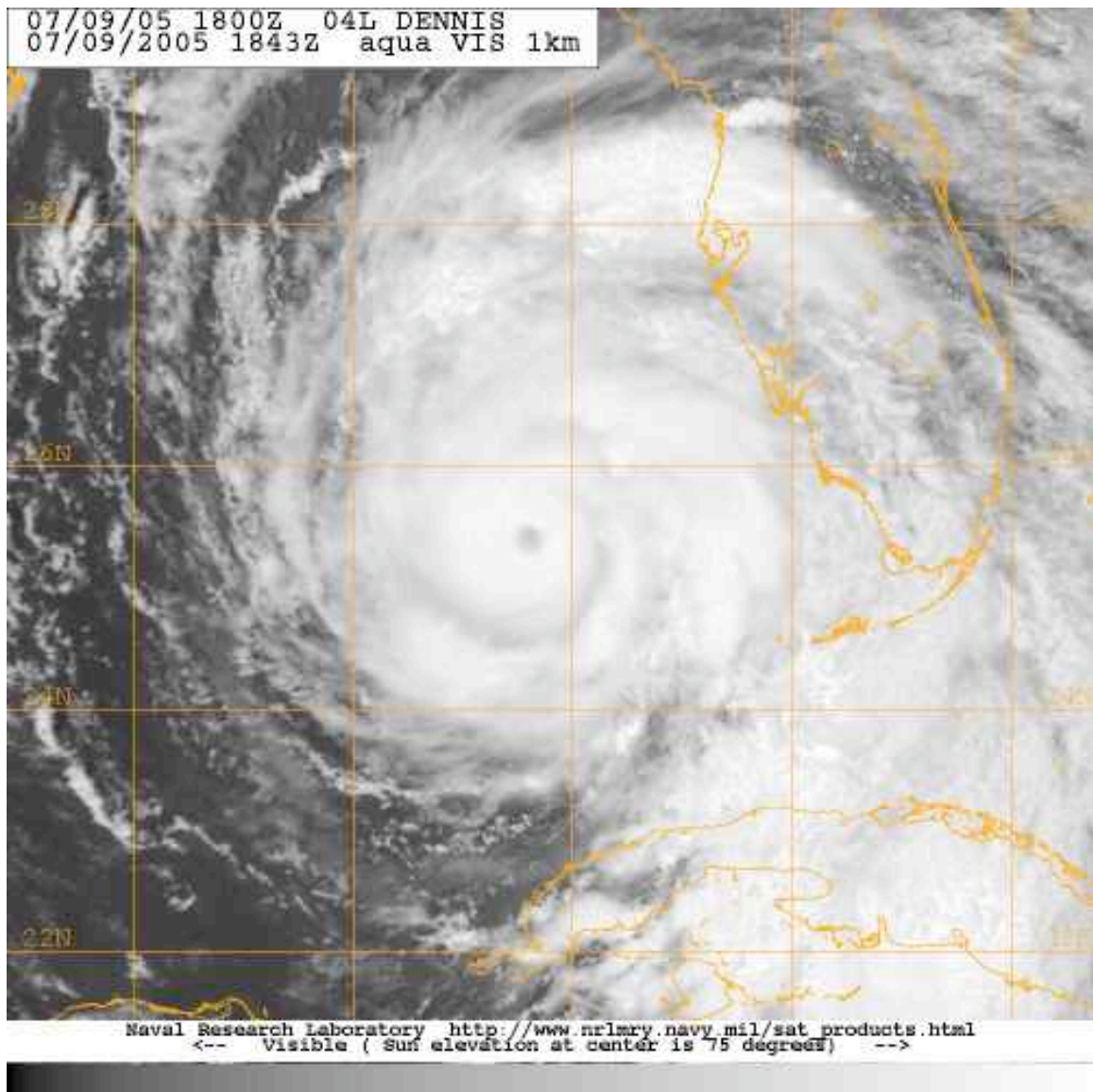


Fig. 7: High-resolution satellite imagery of Hurricane Dennis at 1843 UTC 9 July.

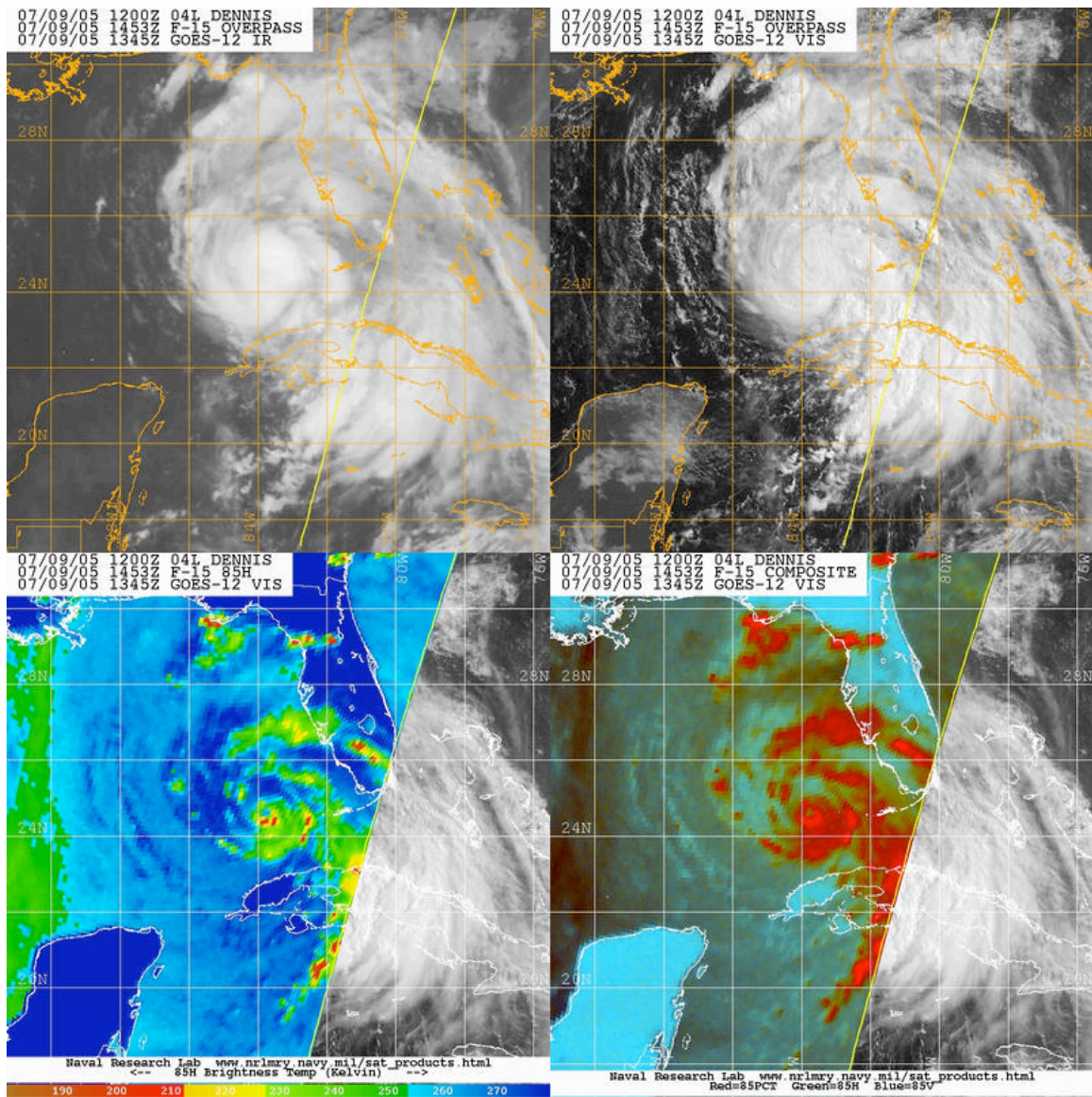


Fig. 8: IR, visible, and microwave satellite imagery of Hurricane Dennis near 1400 UTC 9 July.